

## Federal Aviation Administration, DOT

## § 29.251

whichever is less, to  $1.1 V_H$  or  $1.1 V_{NE}$ , whichever is less, with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power for level flight at  $0.9 V_H$  or  $0.9 V_{NE}$ , whichever is less;
- (4) The landing gear retracted, and
- (5) The rotorcraft trimmed at  $0.9 V_H$  or  $0.9 V_{NE}$ , whichever is less.

(c) *Autorotation*. Static longitudinal stability must be shown in autorotation at airspeeds from 0.5 times the speed for minimum rate of descent, or 0.5 times the maximum range glide speed for Category A rotorcraft, to  $V_{NE}$  or to  $1.1 V_{NE}$  (power-off) if  $V_{NE}$  (power-off) is established under § 29.1505(c), and with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power off;
- (4) The landing gear—
  - (i) Retracted; and
  - (ii) Extended; and
- (5) The rotorcraft trimmed at appropriate speeds found necessary by the Administrator to demonstrate stability throughout the prescribed speed range.

(d) *Hovering*. For helicopters, the longitudinal cyclic control must operate with the sense, direction of motion, and position as prescribed in § 29.173 between the maximum approved rearward speed and a forward speed of 17 knots with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power required to maintain an approximate constant height in ground effect;
- (4) The landing gear extended; and
- (5) The helicopter trimmed for hovering.

(Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5084, 29 FR 16150, Dec. 3, 1964, as amended by Amdt. 29-3, 33 FR 966, Jan. 26, 1968; Amdt. 29-12, 41 FR 55471, Dec. 20, 1976; Amdt. 29-15, 43 FR 2327, Jan. 16, 1978; Amdt. 29-24, 49 FR 44436, Nov. 6, 1984]

### § 29.177 Static directional stability.

Static directional stability must be positive with throttle and collective controls held constant at the trim conditions specified in § 29.175 (a), (b), and (c). Sideslip angle must increase steadily

with directional control deflection for sideslip angles up to  $\pm 10^\circ$  from trim. Sufficient cues must accompany sideslip to alert the pilot when approaching sideslip limits.

[Amdt. 29-24, 49 FR 44436, Nov. 6, 1984]

### § 29.181 Dynamic stability: Category A rotorcraft.

Any short-period oscillation occurring at any speed from  $V_Y$  to  $V_{NE}$  must be positively damped with the primary flight controls free and in a fixed position.

[Amdt. 29-24, 49 FR 44437, Nov. 6, 1984]

## GROUND AND WATER HANDLING CHARACTERISTICS

### § 29.231 General.

The rotorcraft must have satisfactory ground and water handling characteristics, including freedom from uncontrollable tendencies in any condition expected in operation.

### § 29.235 Taxiing condition.

The rotorcraft must be designed to withstand the loads that would occur when the rotorcraft is taxied over the roughest ground that may reasonably be expected in normal operation.

### § 29.239 Spray characteristics.

If certification for water operation is requested, no spray characteristics during taxiing, takeoff, or landing may obscure the vision of the pilot or damage the rotors, propellers, or other parts of the rotorcraft.

### § 29.241 Ground resonance.

The rotorcraft may have no dangerous tendency to oscillate on the ground with the rotor turning.

## MISCELLANEOUS FLIGHT REQUIREMENTS

### § 29.251 Vibration.

Each part of the rotorcraft must be free from excessive vibration under each appropriate speed and power condition.